
New Taxa and Nomenclatural Changes in *Allophyllum*, *Gilia*, and *Navarretia* (Polemoniaceae)

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ABSTRACT. Studies of certain species problems in *Allophyllum*, *Gilia*, and *Navarretia* resulted in the following nomenclatural changes: *Gilia* subg. *Kelloggia* is reduced to sectional status, two new species and one new subspecies are described (*Gilia lottiae*, *Navarretia myersii*, *N. hamata* subsp. *parviloba*), two subspecies are elevated to species (*Navarretia jaredii*, *N. rosulata*), one variety is elevated to subspecies (*N. nigelliformis* subsp. *radians*), and eight new combinations are proposed (*Allophyllum gilioides* subsp. *violaceum*, *Gilia brecciarum* subsp. *jacens*, *G. sinistra* subsp. *pinnatisecta*, *Navarretia leucocephala* subsp. *bakeri*, *N. leucocephala* subsp. *minima*, *N. leucocephala* subsp. *pauciflora*, *N. leucocephala* subsp. *plieantha*, and *N. intertexta* subsp. *propinqua*).

These changes are included in treatments of the same genera contributed by the author to the *Jepson Manual: Higher Plants of California* (Hickman, 1993).

This report is presented in order to validate nomenclatural changes found necessary during preparation of treatments of *Allophyllum*, *Gilia*, and *Navarretia* for the *Jepson Manual: Higher Plants of California* (Hickman, 1993). A more detailed account of studies that led to some of the decisions will be forthcoming elsewhere.

ALLOPHYLLUM (NUTTALL) V. GRANT

Allophyllum is a small genus occurring in the mountains of the western United States. All species are annual, the stems leafy, corollas short-or long-tubed, and blue, purple, pink, or white. Although segregated from *Gilia* by Grant & Grant (1955), it was maintained as a section of *Gilia* by Cronquist (1984).

Characters distinguishing *Allophyllum* from *Gilia* are its nonscapose habit, leafier stems, and distinctive trichome type (fine-stalked, gland-tipped), seeds generally boat-shaped, and leaf-lobes thickened at the tip, not fine-pointed as in *Gilia*.

Allophyllum violaceum (Heller) A. & V. Grant and *A. gilioides* (Benth) A. & V. Grant are

closely related species, with the former occurring generally at higher elevations. Typical *A. violaceum* occurs from 2,000 to 2,900 m in the high Sierra Nevada of California and in the mountains of western Nevada. The plants are small (generally 6–12 cm tall), have few-lobed leaves, and 2–3 flowers per cluster. *Allophyllum gilioides* occurs at lower elevations, mostly below 2,000 m; the plants are larger (14–60 cm tall), with larger, many-lobed leaves, and a glomerate inflorescence, 4–8 flowers per cluster. The two taxa intergrade in some areas at middle elevations (1,200–1,800 m) where their ranges overlap, as in Kern Canyon in the southern Sierra Nevada. Since a clear distinction between them is not possible throughout, I propose the following new combination.

Allophyllum gilioides (Benth) A. & V. Grant subsp. ***violaceum*** (Heller) Day, comb. et stat. nov. Basionym: *Gilia violacea* Heller, Muhl. 1: 56. 1904. *Allophyllum violaceum* (Heller) A. & V. Grant, Aliso 3: 106. 1955. *Gilia gilioides* Benth var. *violacea* (Heller) Cronq., Intermountain Flora 4: 132. 1984. TYPE: U.S.A. California: Nevada Co., lower end of Donner Lake, Heller 6873 (holotype, DS; isotypes, NY, UC).

GILIA RUIZ & PAVÓN

The total number of species of *Gilia* sensu stricto (excluding *Ipomopsis*) is ± 70 , of which 9 are South American. In North America the genus is confined to the western states, with the greatest concentration of species in California, which has 47 of the approximately 60 species, as treated for the *Jepson Manual*. In this work the species are grouped in six sections: *Arachnion*, *Gilia*, *Giliandra*, *Giliastrum*, *Kelloggia*, and *Saltugilia*. This is modified from the sectional arrangement of Grant (1959), especially in the addition of the new section *Kelloggia*.

Two species groups were originally included in *Gilia* sect. *Saltugilia* V. & A. Grant: the *G. splendens* group and the *G. leptalea*–*G. capillaris* group (Grant & Grant, 1954). New studies show that *G.*

capillaris Kellogg and *G. leptalea* (A. Gray) E. Greene are so different from the *G. splendens* group in habit, leaf form, and trichome type, as well as pollen morphology, that they constitute a disparate element in *Gilia* sect. *Saltugilia*, and should be placed elsewhere. Since no existing section is suitable, a new section, *Kelloggia*, reduced from *Gilia* subg. *Kelloggia* H. Mason & A. D. Grant, is proposed.

Of the four species included in *Gilia* subg. *Kelloggia*, only *G. capillaris* and *G. leptalea*, plus a segregate species, *G. sinistra* M. E. Jones, are retained in section *Kelloggia*. The remaining species from subgenus *Kelloggia* are placed elsewhere: *G. tenerrima*, appearing close to *G. inyoensis*, is more suitably placed in section *Giliastrum*; and *Gilia minutiflora* has been transferred to *Ipomopsis* (*I. minutiflora* (Benth.) V. Grant).

Gilia* sect. *Kelloggia (H. Mason & A. D. Grant) Day, stat. nov. Basionym: *Gilia* subg. *Kelloggia* H. Mason & A. D. Grant, *Madroño* 9: 219. 1948, as to type, but not as to all species included. TYPE: *Gilia capillaris* Kellogg.

Erect annuals. Plants glandular-puberulent or partly glabrous, the glands minute and black. Leaves mostly cauline, linear to narrowly elliptic, tapered proximally and distally, lower leaves generally few or rarely numerous, but not in a definite rosette, entire or rarely pinnately lobed, upper leaves entire or digitate with 2–4 small lobes. Inflorescence loose, 1–3 flowers above a leaf, pedicels filiform. Calyx tubular in lower half, glabrous or glandular-puberulent, splitting in sinuses at maturity; corolla funnelform. Stamens attached in upper throat, slightly exerted to well exerted, pollen blue. Style included or exerted. Capsule equal to or more often shorter than calyx, valves splitting to base at maturity; seeds 1–6 per cell, mucilaginous when wet.

Gilia sinistra M. E. Jones, a little known segregate of *G. capillaris*, is a small-flowered species distinguished from the latter by frequently digitate (rather than entire) leaves, acute (not acuminate) calyx lobes, glabrous (not puberulent) corolla tube, and pink (not pale blue) corolla lobes. The two species have been found growing together in a number of localities in the Sierra Nevada, yet in all instances they appeared entirely distinct.

A larger-flowered taxon, closely related to *G. sinistra* and differing in little else besides corolla size, was described as a subspecies of *G. leptalea*. A new combination, proposed here, transfers it to *G. sinistra*.

Gilia sinistra M. E. Jones subsp. ***pinnatisecta*** (Mason & A. D. Grant) Day, comb. nov. Basionym: *Gilia leptalea* (A. Gray) E. Greene subsp. *pinnatisecta* Mason & A. D. Grant, *Madroño* 9: 220. 1948. TYPE: U.S.A. California: Lake County, *Baker 2299a* (holotype, UC).

Gilia brecciarum M. E. Jones subsp. ***jacens*** (A. & V. Grant) Day, comb. et stat. nov. Basionym: *Gilia jacens* A. & V. Grant, *Aliso* 4: 437. 1960. TYPE: U.S.A. California: Kern/Ventura Co. line, between Stauffer Jct. and Mt. Pinos, *V. Grant 9980* (holotype, RSA).

Experimental crosses between *Gilia jacens* and *G. tenuiflora* Benth. resulted in semifertile hybrids (Grant & Grant, 1960). A close relationship between these two species was also inferred because of their similar corolla shape and color, with the throat generally flaring and entirely or in part dark purple.

The probable origin of *Gilia jacens* from *G. tenuiflora* has been postulated by Grant (1971, 1981). A reexamination of *G. jacens* in the herbarium, however, shows that it differs from *G. tenuiflora* in ways that suggest it has a closer affinity with *G. brecciarum*, especially subspecies *brecciarum*.

Thus, *Gilia jacens* and *G. brecciarum* subsp. *brecciarum* share the following characters: (1) stems densely cobwebby near the base (*G. tenuiflora* stems at base are generally glabrous to slightly pubescent); (2) flowers and fruits in clusters (*G. tenuiflora* flowers and fruits are not clustered, or only slightly so); and (3) calyx ribs densely pubescent, their width exceeding the membrane (*G. tenuiflora* calyx ribs are generally slightly pubescent and narrower than the membrane).

Gilia jacens is distinguished from *G. brecciarum* subsp. *brecciarum* by its long decumbent branches, rather finely cut leaves, and generally small corolla with throat often included. However, the two taxa are often difficult to distinguish, as in the Tehachapi and Piute Mountains of southern California, where they intergrade.

It appears that *Gilia jacens* is a close relative of *G. brecciarum* subsp. *brecciarum* that may have undergone some introgression from the *G. tenuiflora* species group. The decision to transfer it to *G. brecciarum* as a subspecies reflects this view of its relationships.

Gilia lottiae Day, sp. nov. TYPE: U.S.A. Nevada: Churchill Co., Hot Springs Mountains, 11.5 mi. N of Hazen on Pole-line Road, 8 May 1980, *Day & Lott 80-36* (holotype, CAS; isotype, RSA). Figure 1.

Gilia leptomeria A. Gray var. *myriacantha* M. E. Jones, Contr. W. Bot. 12: 53. 1908. TYPE: U.S.A. California: San Bernardino Co., Needles, Jones 9868 (holotype, POM).

Annua glanduloso-puberula. Folia radicalia rosulata applanate, \pm succulenta, dentata vel pinnatifida, supra glabra, venis subtus glandulosis puberulis et areniferis, rachidibus latis, folia caulina integra. Inflorescentiae immaturae nutantes. Calycis membrana affixa prope apices calycis loborum. Corolla 4–7 mm longa, tubo exserto, fauce luteo, fauce tubum aequilongae vel longiore, lobis lanceolatis vel ovatis, acutis vel acuminatis, integris, roseis vel lavendulis vel albis. Pollen album. Stamina et stylus parum exserta. Capsula ovoidea, 3–5 mm longa, capsula calyx 1.2–1.5-plo longior. Semina multa, sub aqua immutata. Habitatio arenacea. $n = 25$, aliquando $n = 16$.

Plants 5–43 cm high, glandular-puberulent. Stems 1–numerous, spreading from base. Basal leaves 2–11 cm long in flat rosette, bright green, succulent in vigorous plants, \pm widely strap-shaped, glabrous and shining above, with veins on lower surfaces glandular-puberulent and sand-dotted, dentate or pinnately lobed, lobes generally entire, spreading, cuspidate, shorter than width of rachis, upper leaves entire, linear or sublinear. Inflorescence nodding and clustered in bud, becoming erect, loose, many-branched. Calyx lobes acute, bordered by membrane nearly to apex; corolla 4–7 mm long, tube glabrous, stout, generally exserted, throat tapered and as long as or longer than tube, yellow, lobes lanceolate to narrowly ovate, acute to acuminate, entire, pink, lavender, or white; pollen white, stamens and style slightly exserted. Capsule 3–5 mm long, 1.2–1.5 \times calyx, ovoid. Seeds many, not mucilaginous when wet. $n = 25$, sometimes $n = 16$.

Distribution. California, Mojave Desert (Clark Mts.) to the desert slopes of the Sierra Nevada, to eastern Washington, Idaho, Utah, and Arizona, 400–2,100 m elevation. Habitat usually deep sand.

Gilia lottiae is a member of the *G. leptomeria* complex and a segregate of *G. leptomeria* A. Gray, from which it is distinguished by its broad basal leaves with upper surface glabrous and shining (not

puberulent), its long-tapered (not short) corolla throat, its attenuate and entire (not mucronate) corolla lobes (Fig. 1), and its usually hexaploid chromosome number. This chromosome number, $n = 25$, was first reported by Grant & Latimer (in Grant, 1959). The voucher, listed with the paratypes below, is *V. & A. Grant 9821* (RSA).

The tetraploid race of *G. lottiae* ($n = 16$) differs only slightly from the hexaploid, with the corolla tube shorter, included in the calyx, and corolla lobes erose, not entire. Its chromosome number, $n = 16$, is new for *Gilia*, having not been previously reported for the genus.

Gilia lottiae is named posthumously for Patricia Lott of Fallon, Nevada, whose freely offered assistance as a guide and plant-hunter was valued and deeply appreciated.

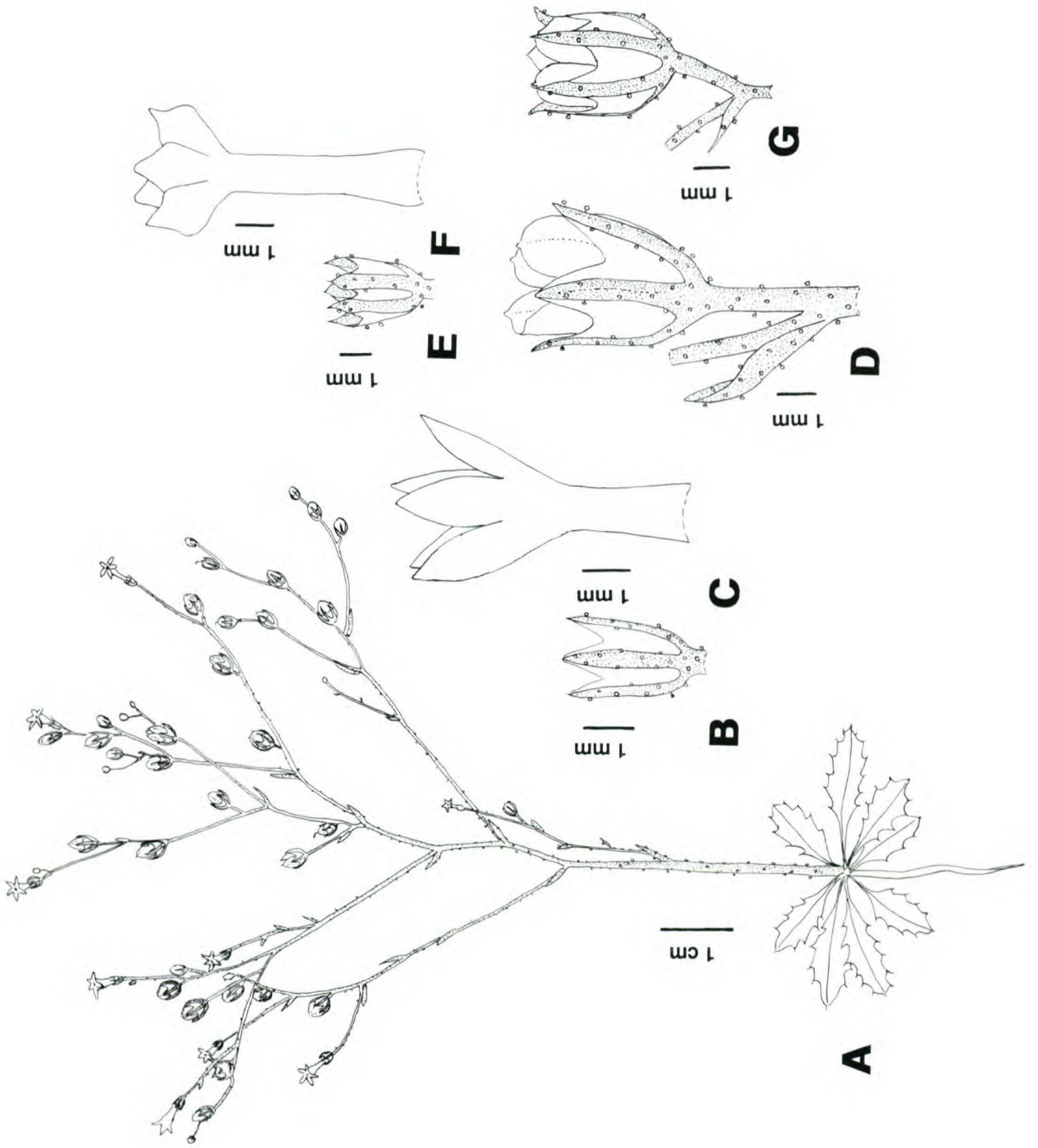
Paratypes. U.S.A. **Idaho:** Butte Co., 13 m NE of Arco, Hitchcock & Muhlick 21303 (DS). **Oregon:** Malheur Co., ca. 4 m NW of Harper, Twp. 19 S, R 41 E, ca. S 23, Cronquist 7833 (DS); Lake Co., 7 m SW of Wagontire, J. T. Howell 28727 (CAS). **Nevada:** Humboldt Co., Winnemucca, *V. & A. Grant 9821* ($n = 25$; RSA); Churchill Co., 25 m S of Fallon, Walker River Indian Reservation, Rawhide Rd., 28 Apr. 1978, Day & Lott 78-18 ($n = 25$; CAS); 6.1 m N of Fallon, Indian Lakes Rd., 29 Apr. 1978, Day & Lott 78-33 ($n = 25$; CAS); 5 m SE of Hazen, side-rd. off Hwy. 50, Swingle Bench, 22 May 1979, Day & Lott 79-35.8 ($n = 25$; CAS); 6.4 m N of Hazen on pole-line rd., 8 May 1980, Day & Lott 80-27 ($n = 16$, CAS, RSA); Washoe Co., along rd. from Bedell Flat to Warm Springs Valley, Tiehm, Lott & Williams 2112 (CAS). **California:** Mono Co., Rough Creek between Potato and Bodie mountains, Hardham 15116 (CAS); Inyo Co., Eureka Valley, DeDecker 3173 (CAS); San Bernardino Co., W of Clark Mts. on Cima Rd., 0.8 m N of road to Coliseum Mine, Day & Malley 82-14 (CAS); Los Angeles Co., just outside Saddleback Butte State Park, Keil et al. 12323 (CAS).

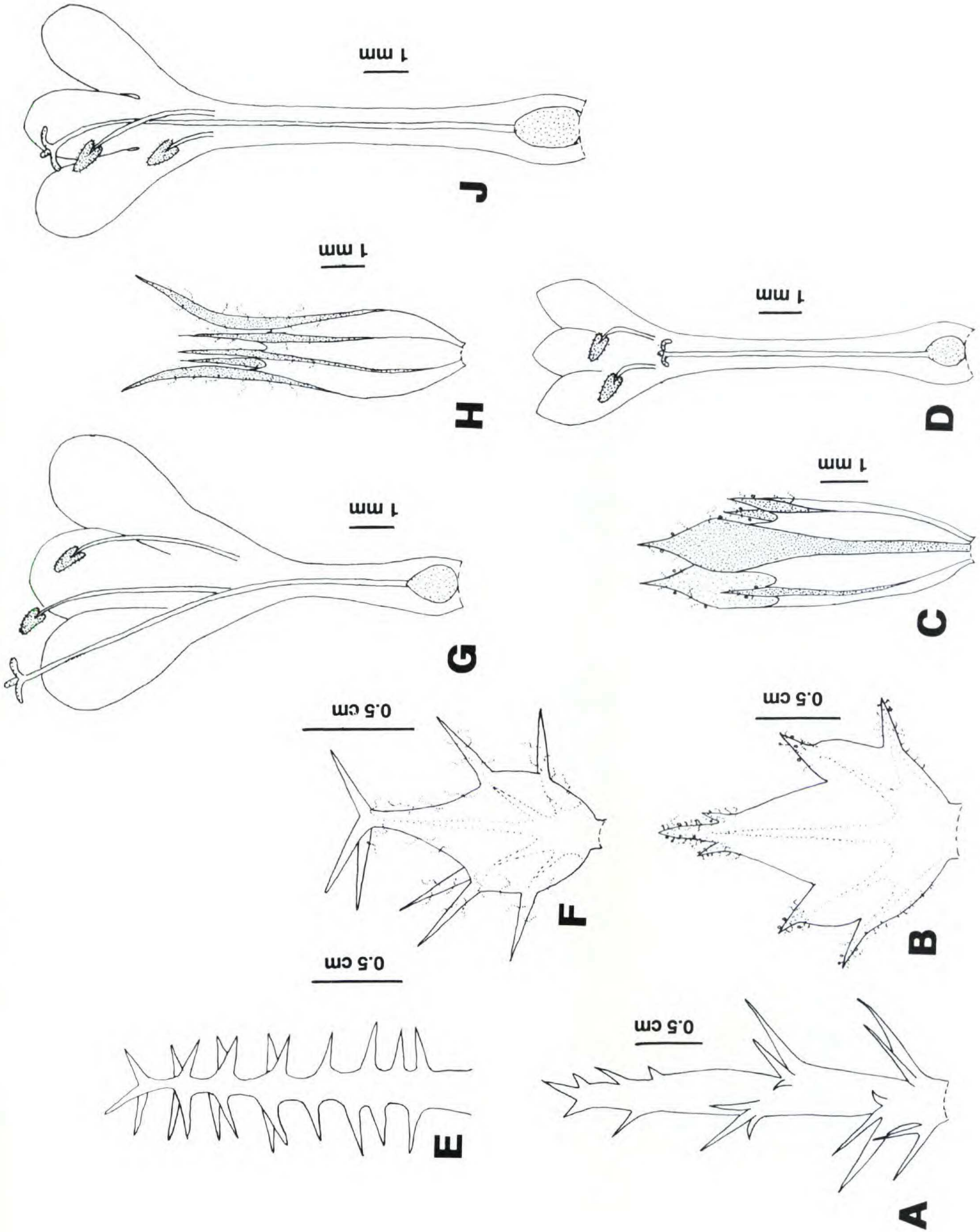
NAVARRETIA RUIZ & PAVÓN

The dense heads of *Navarretia*, with their spinose bracts, contain characters often critical in the solution of taxonomic problems in the genus. This is

Figure 1. A–D, *Gilia lottiae* Day (Day & Lott 79-39, CAS). —A. Habit of plant in flower and fruit. —B. Calyx. —C. Corolla. —D. Mature calyx and capsule. E–G, *G. leptomeria* (Day 82-27, CAS). —E. Calyx. —F. Corolla. —G. Mature calyx and capsule.

Figure 2. A–D, *Navarretia atractyloides* (Benth.) Hooker & Arnott (Day 89-2, CAS). —A. Lower leaf. —B. Outer bract. —C. Calyx. —D. Corolla segment with stamens and style. E, F, H, J, *N. hamata* subsp. *parviloba* (Day 92.1, CAS). —E. Lower leaf. —F. Outer bract. —H. Calyx. —J. Corolla segment with stamens and style. G, *N. hamata* subsp. *hamata* (Roos 30 June 1965, RSA). —G. Corolla segment with stamens and style.





well demonstrated by the key to *N. atractyloides* (Bentham) Hooker & Arnott and *N. hamata* E. Greene, as these two species are separated on bract (and leaf) form. Bract characters are also important in the identification of the newly described *N. hamata* subsp. *parviloba*.

Navarretia hamata E. Greene subsp. **parviloba**

Day, subsp. nov. TYPE: U.S.A. California: Santa Cruz Co., Ben Lomond, 18 July 1962, *Rose 62073* (holotype, CAS; isotypes, DS, RSA). Figure 2.

Affinis subsp. *hamatae* sed differt a fauce et lobis corollae angustis, et a subsp. *leptantha* (E. Greene) H. Mason tubo corollae incluso, ambo spinis ternis terminalibus foliorum et bractearum externarum aequalibus divaricatis rectangulatis, bracteis externis villosis plerumque non glandulosis, lobis corollae sublavandulis vel lavendulis, staminibus brevibus.

Plants not mephitic. Leaves pinnate with lobes spreading at right angles, lobes spinose, entire or forked. Rachis of lower leaves linear, cauline leaf rachis linear to lanceolate, narrowed below a terminal, 3-lobed hook; lobes of hook equal, widely divergent, middle lobe markedly recurved. Heads terminal on main stems and axillary branches; outer bracts long-hairy, generally nonglandular, bearing terminal hooks as on the cauline leaves; calyx lobes entire or the largest lobes toothed; corolla 8–14 mm, tube white, lobes 2–3 mm long, pale blue or lavender; stamens and style included in tube or slightly exerted.

Distribution. California, southern Santa Cruz Mountains (Santa Cruz Co.) to Ventura County in the South Coast Ranges, 30–1,000 m. Openings in chaparral, in firm sand, or sand and gravel, and on sand hills.

Navarretia hamata subsp. *parviloba* occurs as far north as the Santa Cruz Mountains, whereas subspecies *hamata* and *leptantha* are restricted to southern California and Baja California, Mexico. It differs from subspecies *hamata* in its paler corolla with narrower throat and smaller lobes, and in its shorter stamens and style.

In Los Angeles County where the ranges of subspecies *parviflora* and *hamata* overlap, subspecies *hamata* varies toward subspecies *parviloba* in leaf and bract form, with bract lobes tending to be equal, and the leaf axis widely lanceolate. This apparently introgressive form of subspecies *hamata* can still be distinguished by its brightly colored corolla with a wide throat.

Hoover (1970) first reported the existence of an undescribed northern race of *Navarretia hamata*

with paler corolla, but did not give it a subspecific name. He also called attention to an error in which this taxon was represented in a key and in a drawing as *N. atractyloides* (Mason in Abrams, 1951). The flowers of *N. hamata* subsp. *parviloba* and of *N. atractyloides* are similar in having small corolla lobes, but in bract shape and leaf form the two are quite different, as shown in the key and in Figure 2. They are often found growing together; consequently numerous mixed gatherings are encountered in the same herbarium collections. They are partially isolated seasonally: *N. hamata* subsp. *parviloba* is generally found in late flower and fruit when *N. atractyloides* is in vegetative condition or early flower.

Paratypes. U.S.A. **California:** Santa Cruz Co., near Jamison Rd. and Boulder Creek–Big Basin Highway, 15 July 1953, *Thomas 3500* (DS, RSA); Monterey Co., Pacific Grove, pine woods, 25 May 1903, *Heller 6782* (DS, POM); San Luis Obispo Co., 3 mi. NW of Nipomo, 11 July 1964, *Hoover 9178* (CAS); Ventura Co., Santa Susana Pass, 30 June 1928, *J. Howell 1017* (RSA).

KEY TO *NAVARRETTIA ATRACTYLOIDES* AND *N. HAMATA*

- 1a. Upper leaves and outer bracts tipped with 3 antrorse, parallel lobes; terminal lobe longest, slightly downcurved *N. atractyloides*
- 1b. Upper leaves and outer bracts tipped with 3 divergent lobes; terminal lobe equal to or slightly longer than adjacent lobes, and markedly recurved *N. hamata*
 - 2a. Stamens short, slightly exerted; bracts generally not glandular; lobes at tip equal; corolla lobes white to lavender, aging blue subsp. *parviloba*
 - 2b. Longest stamens exceeding corolla lobes; bracts glandular; terminal lobe equal to or longer than adjacent lobes; corolla lobes bright pink to purple.
 - 3a. Corolla tube included, throat wide, lobes ovate; cauline leaf axis linear to widely lanceolate subsp. *hamata*
 - 3b. Corolla tube well exerted, throat narrow, lobes linear to narrowly ovate; cauline leaf axis linear . . . subsp. *leptantha*

Navarretia intertexta (Bentham) Hooker subsp.

propinqua (Suksdorf) Day, comb. et stat. nov. Basionym: *Navarretia propinqua* Suksdorf, Allg. Bot. Z. Syst. 12: 26. 1904. *Navarretia intertexta* (Bentham) Hooker var. *propinqua* (Suksdorf) Brand, Pflanzenr. 4 (250): 163. 1907. TYPE: U.S.A. Washington: Spokane Co., Falcon Valley, *Suksdorf 2700* (NY).

This taxon is a lower-growing, procumbent relative of the typically erect *Navarretia intertexta*. Subspecies *propinqua* differs also in its smaller flowers and shorter, nearly glabrous (not hairy) bracts.

It is the predominant subspecies of *N. intertexta* east of the summits of the Cascade Range and the Sierra Nevada from Washington to California and east to Montana, Wyoming, Colorado, and Arizona.

The characters distinguishing subspecies *propinqua* are inconstant, because intermediate specimens are occasionally seen. For example, plants with the compact habit of subspecies *propinqua* sometimes have densely hairy heads or larger bracts as in subspecies *intertexta*. Hence, I am in agreement with Brand, who regarded the two taxa as conspecific, but elevate Brand's variety *propinqua* to subspecific level for consistency in the treatment of this genus for the *Jepson Manual*.

The *Navarretia leucocephala* group is viewed here as including five species: *N. fossalis* Moran, *N. involucrata* Ruiz & Pavón (South America), *N. leucocephala* with four subspecies, *N. myersii* P. S. Allen & Day, sp. nov., and *N. prostrata* (A. Gray) E. Greene. All species are adapted to a vernal pool habitat, germinating while submerged and completing their life cycle after the water recedes.

These are plants of intriguing but cryptic variability. The treatment advocated here differs from some previous works in that *Navarretia bakeri*, *N. minima*, *N. pauciflora*, and *N. plieantha* are reduced to subspecies under *N. leucocephala*. This step was undertaken after it became evident that intermediates exist between certain of these species as well as with typical *N. leucocephala* where their ranges overlap. An exception is *N. myersii*, which is similar to but distinct from *N. leucocephala*.

The southern California species *Navarretia prostrata* and *N. fossalis* show no evidence of intergrading with each other. Generally their ranges do not coincide, but one possible case of sympatry is evident from the following two cited collections, which are clearly distinct: California: Riverside County, Rancho California, Mesa de Burro, *R. F. Thorne et al.* 45563 (UC) (*N. prostrata*); same general locality, *Thorne & Lathrop* 47317 (UC) (*N. fossalis*).

Navarretia leucocephala Bentham, Pl. Hartwegianae 324. 1849. TYPE: U.S.A. California: Sacramento Valley, *Hartweg* 247 (holotype, K).

Navarretia leucocephala Bentham subsp. ***bakeri*** (H. Mason) Day, comb. et stat. nov. Basionym: *Navarretia bakeri* H. Mason, *Madroño* 8: 198. 1946. TYPE: U.S.A. California: Lake Co., Lower Lake, 28 June 1945, *H. Mason* 12599 (holotype, UC).

Navarretia leucocephala Bentham subsp. ***minima*** (Nuttall) Day, comb. et stat. nov. Basion-

ym: *Navarretia minima* Nuttall, Proc. Acad. Nat. Sci., Philadelphia 4: 13. 1848. *Gilia minima* (Bentham) A. Gray Proc. Amer. Acad. Arts 8: 269. 1870. TYPE: U.S.A. Washington: near Walla Walla, plains of the Oregon, *Nuttall s.n.* (holotype, BM).

Navarretia leucocephala Bentham subsp. ***pauciflora*** (H. Mason) Day, stat. et comb. nov. Basionym: *Navarretia pauciflora* H. Mason, *Madroño* 8: 200. 1946. TYPE: U.S.A. California: Lake Co., 5 m N of Lower Lake, 12 May 1945, *H. Mason* 12583 (holotype, UC; isotypes, CAS, UC).

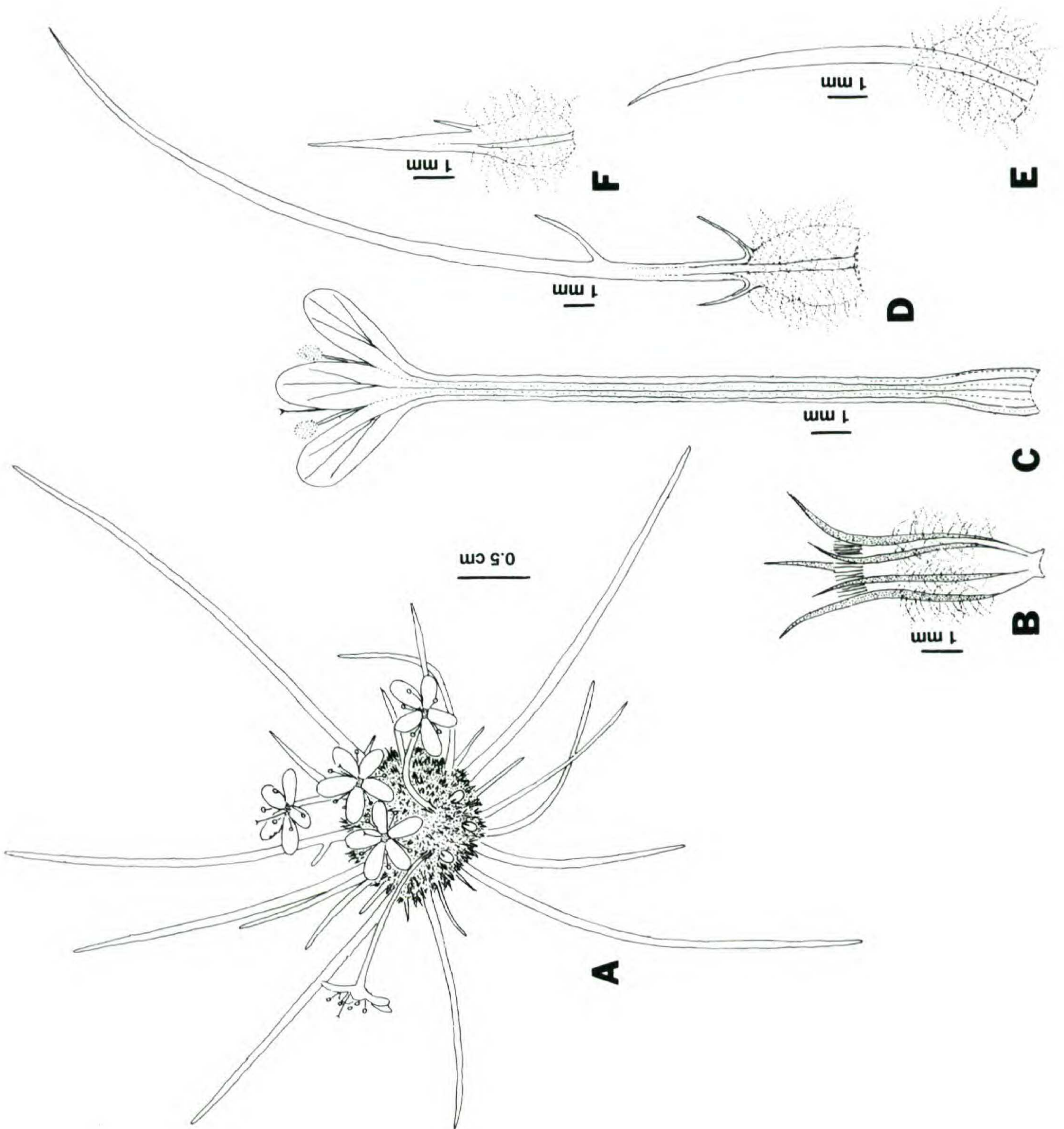
Navarretia leucocephala Bentham subsp. ***plieantha*** (H. Mason) Day, stat. et comb. nov. Basionym: *Navarretia plieantha* H. Mason, *Madroño* 8: 199. 1946. TYPE: U.S.A. California: Lake Co., Mt. Hanna, NW slope, Boggs Lake, 29 June 1945, *H. Mason* 12628 (holotype, UC).

The following new species, related to *N. leucocephala* but differing in some striking details, was discovered by Perry Allen. Mr. Allen sent the specimens, here designated as the type, with a description from living plants and cooperated further in fieldwork relating to this study.

Navarretia myersii P. S. Allen & Day, sp. nov. TYPE: U.S.A. California: Merced Co., 13 m NE of Merced, near Mariposa Co. line, Myers (Flying M) Ranch, 4 May 1982, *Perry S. Allen s.n.* (holotype, CAS; isotype, US). Figure 3.

Navarretia leucocephalae affinis sed planta matura prostratum, folia longiuscula, \pm curva, pauciloba, capitulum plerumque solitarium, receptaculum incrassatum, alae bractearum villosae, flores sessilis, costae calycis villosae, corolla 12–21 mm longa, tubus filiformis, 2–4 \times calyem.

Herbaceous annual, 1–3 cm high, becoming stiffly spinose in maturity, generally with a single prostrate, moundlike head 1–2 cm diam., rarely with 1–2 small secondary heads arising on lateral branches from below. Stem 0–20 mm long, puberulent with recurved hairs or glabrous. Cauline leaves, if present, opposite at base, alternate above. Involucral leaves numerous, radiating, curved, 2–4 \times as long as diameter of the head, nearly entire or few-lobed near base, winged near base, wings membranous, ciliate or glabrous, imbricate; outer bracts well exceeding head, broadly winged, wings densely villous, with generally 2–4 lobes near base, and often 2 near middle, entire, or basal lobes forked, terminal lobe elongate; inner bracts few, mostly near periphery of head, 5–8 mm long, slightly exceeding calyces, entire or 2–4-lobed, villous and winged; wing



ciliate. Inflorescence 5–60-flowered, receptacle thickened with maturity; flowers sessile upon receptacle, crowded, arising successively 1–4 in bract axil. Calyx 4–6 mm long, villous about middle, ciliate in orifice, lobes glabrous, linear, generally entire, slightly outcurved, membrane truncate, ciliate. Corolla 17–21 mm long, cream-white, salverform, tube filiform, 12–16 mm long, 2–4 × calyx, throat short, constricted, lobes 2.5–3 mm long, oblong to narrowly ovate, spreading, with a single vein entering base and 0–2 branch veins above. Stamens attached just below sinuses, exerted, unequal, longest exceeded by corolla lobes, pollen yellow. Style well-exserted, generally equal to or exceeding corolla. Capsule ± 2 mm long, broadly ovoid, obscurely 2-celled, membranous, sticking to seeds until wet, valves separating in lower half when wet. Seeds 2–4, reddish brown, ovoid, erect in the cells, finely reticulate-pitted, sticking together, mucilaginous and separating when wet.

Distribution. Known from only a few localities at the border between the Central Valley and Sierra Nevada foothills in Sacramento, Amador, and Merced counties. A rare endemic, *Navarretia myersii* occurs in moist or dried beds of shallow vernal pools. Soil type at the type locality is, according to Perry Allen, Hornitos series, strongly acidic.

Corolla tube length in *Navarretia myersii* is greatest at the type locality, as compared with plants seen in the other cited stations. In the latter plants the corolla tube is well exerted but not to the extreme found in the type collection (Fig. 3).

The species is named for John W. Myers, owner of the Flying M Ranch, the type locality of *Navarretia myersii*. This is in recognition of his persistence in protecting the area from overgrazing and other potential environmental disturbances, and for courtesies extended to interested botanists of several California research and conservation organizations.

Paratypes. U.S.A. **California:** E Merced Co., Flying M Ranch (type locality) 15 May 1984, *Day & R. P. Allen 84-2* (CAS), 17 Apr. 1985, *Day et al 85-18* (CAS), *Ertter 8272* (UC); Sacramento Co., California Dept. of Fish and Game Phoenix Field Ecological Reserve, 4 Apr. 1981, *Holland 1026* (CAS), 29 Apr. 1988, *Day & P. S. Allen 88-10* (CAS); Amador Co., 4 May 1922, *Otis 1197* (DS); 5 mi. W of Ione on rd. to highway 16, 10 May 1941, *Heller 16114* (UC).

Navarretia nigelliformis E. Greene subsp. ***radians*** (J. Howell) Day, stat. nov. Basionym: *Navarretia nigelliformis* E. Greene var. *radians* J. Howell, *Leaf. W. Bot.* 2: 136. 1938. TYPE: U.S.A. California: San Benito Co., 12 mi. S of Paicines, 20 May 1937, *Howell 12962* (holotype, CAS; isotype, JEPS).

The elevation of *Navarretia nigelliformis* var. *radians* to subspecific level is for consistency in the *Jepson Manual* treatment of the genus. Recent information, however, suggests that an alternative disposition may be necessary in the future, since subspecies *radians* is now known to be sympatric with typical *N. nigelliformis* in at least one area, without any evident intergradation.

This observation is based on collections made in 1985 and 1986 from a population of these taxa on the eastern border of the Coast Ranges in western Merced County, California, along the North Fork of Los Banos Creek by Lacy & Hurt (nos. 51 and 88, at CAS), and by Janeway & Janeway (nos. 1610, 1617, 1677, 1688, 1690, and 1691, also at CAS).

Because of its multiple seeds and purple-spotted corolla throat, *Navarretia nigelliformis* subsp. *radians* keys to *N. nigelliformis*, yet in other characters, such as its spreading habit, smaller flower size, and grayish hairy heads, it resembles *N. heterandra* H. Mason. The relationships of this group of taxa are currently under study.

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Figure 3. *Navarretia myersii* P. S. Allen & Day, drawn from topotype material (*Day et al. 85-18*, CAS). —A. Habit of plant in bud and flower. —B. Calyx. —C. Segment of corolla. —D, E. Outer bracts. —F. Inner bract.

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